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Patent
Attorney's Docket No. 007198-536

THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of)	
)	
Wing Kin CHAN)	Group Art Unit: 3732
)	
Application No.: 10/631,892)	Examiner: Unassigned
)	
Filed: August 1, 2003)	Confirmation No: 9815
)	
For: COMBING DEVICE WITH)	
ADJUSTABLE TEETH SPACING)	

CLAIM FOR CONVENTION PRIORITY

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

The benefit of the filing dates of the following prior applications in the following foreign countries is hereby requested, and the right of priority provided in 35 U.S.C. § 119 is hereby claimed:

Hong Kong Short-Term Patent Application No. 02106602.5
Filed: September 6, 2002; and

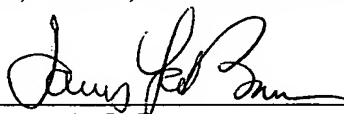
Hong Kong Short-Term Patent Application No. 03100284.2
Filed: January 11, 2003.

In support of this claim, enclosed are certified copies of the prior foreign applications. These applications are referred to in the oath or declaration. Acknowledgment of receipt of these certified copies is requested.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

Date: 2-2-04

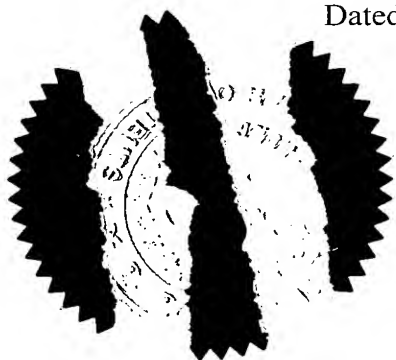
By: 
James A. LaBarre
Registration No. 28,632

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

PATENTS ORDINANCE
Chapter 514
Laws of the Hong Kong Special Administrative Region

The attached is a true copy of the Short-term Patent Application No. 02106602.5, which is still pending.

Dated this 4th day of August 2003.




(YIP CHIU YING RITA)
Intellectual Property Examiner
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Date of receipt

Application No.

02106602-5

Accorded filing date

- 6 SEP 2002

Request for Grant of a Short-Term Patent

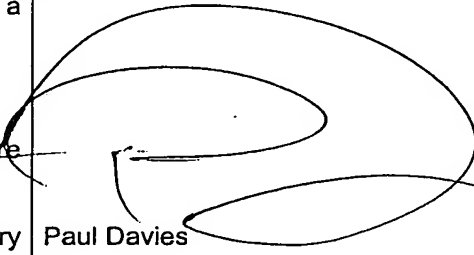
Patents Ordinance sections 113, 116, 125
Patents (General) Rules sections 58, 74

(See the notes on the last page of this form)

01 Your reference	9868441:P/D:HALE:sk
02 Applicant's details (see note (4)(a)) Name (underline surname) Name in Chinese (if applicable) Address Telephone Fax Kind of incorporation Country of incorporation State of incorporation (if applicable)	CHAN, Wing Kin 陳永堅 Block A-C, 4/F., Wing Hin Factory Building, 31-33 Ng Fong Street, San Po Kong, Kowloon
03 Title of invention (see note (4)(b)) English Chinese	COMBING DEVICE WITH ADJUSTABLE TEETH SPACING sec (2)

04 Details of International Patent Classification <i>(see note (5))</i>	IPC Code <i>rel (6)</i> A45D	IPC Edition No. 7
05 Use of micro-organisms <i>(tick the appropriate box)</i> <p>(a) Does the invention require the use of a micro-organism for its performance?</p> <p>(b) If you have ticked "Yes", please indicate whether the micro-organism is available to the public at the date of filing of the application; and</p> <p>whether the micro-organism is described in the application or the specification of the patent in such a manner as to enable the invention to be performed by a person skilled in the art.</p> <p>(c) If you have ticked "No" in both boxes in (b), please give the following details:</p> <p>Name and address of the depositary institution where a culture of the micro-organism is deposited</p> <p>Date of deposit <i>(Day/Month/Year)</i></p> <p>Accession No. of the deposit</p> <p><i>(section 73 and Schedule 1, Patents (General) Rules)</i></p>	<div> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No </div> <div> <input type="checkbox"/> Yes <input type="checkbox"/> No </div> <div> <input type="checkbox"/> Yes <input type="checkbox"/> No </div> <div> Name: Address: </div> <div> </div> <div> </div>	
06 Details of international application If the short-term patent application is based on <p>(a) International Application No.</p> <p>(b) International Filing Date <i>(Day/Month/Year)</i></p> <p>(c) International Publication No.</p> <p>(d) International Publication Date <i>(Day/Month/Year)</i></p> <p>(e) Date of entry into the national phase in the People's Republic of China</p> <p>or</p> <p>Date of issuance of the National Application Notification by the State Intellectual Property Office</p> <p><i>(tick the appropriate box and enter the date in the space provided)</i></p>	<div> </div> <div> </div> <div> </div> <div> </div> <div> <input type="checkbox"/> _____ <i>(Day/Month/Year)</i> </div> <div> or </div> <div> <input type="checkbox"/> _____ <i>(Day/Month/Year)</i> </div>	

<p>(f) Application No. of the Chinese patent application (if known)</p> <p><i>(section 125, Patents Ordinance and section 78, Patents (General) Rules)</i></p>									
<p>07 Details of earlier application If the application is divided or derived from an earlier Hong Kong application</p> <p>(a) Section under which an earlier application is claimed (<i>see note (6)</i>) (<i>tick the appropriate box</i>)</p> <p>(b) Earlier Application No.</p> <p>(c) Earlier Application Filing Date (<i>Day/Month/Year</i>)</p>	<p style="text-align: center;">Patents Ordinance</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <input type="checkbox"/> section 116 </div> <div style="text-align: center;"> <input type="checkbox"/> section 55 </div> </div>								
<p>08 Details of the priority application If a statement of claim of priority under section 111, Patents Ordinance is made (<i>sections 58(5)(c), 69, Patents (General) Rules</i>)</p>	<p>Statement</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Country</th> <th style="width: 33%;">Priority Application No.</th> <th style="width: 33%;">Priority Application Filing Date</th> </tr> </thead> <tbody> <tr> <td style="height: 40px;"></td> <td></td> <td></td> </tr> </tbody> </table>			Country	Priority Application No.	Priority Application Filing Date			
Country	Priority Application No.	Priority Application Filing Date							
<p>09 Details of inventor (<i>see note (4)(a)</i>) (<i>see note (7)</i>)</p> <p style="text-align: right;">Name (<i>underline surname</i>)</p> <p style="text-align: right;">Name in Chinese (<i>if applicable</i>)</p> <p style="text-align: right;">Address</p>	<p><u>CHAN</u>, Wing Kin 陳永堅</p> <p>Block A-C, 4/F., Wing Hin Factory Building, 31-33 Ng Fong Street, San Po Kong, Kowloon</p>								
<p>10 Non-prejudicial disclosure If the applicant is making a claim regarding non-prejudicial disclosure under section 109, Patents Ordinance, please provide a statement giving details relating to such disclosure. (<i>see note (8)</i>)</p>	<p>Statement</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Name and place of the exhibition or meeting</th> <th style="width: 33%;">Opening date of the exhibition or meeting</th> <th style="width: 33%;">Date of first disclosure</th> </tr> </thead> <tbody> <tr> <td style="height: 40px;"></td> <td></td> <td></td> </tr> </tbody> </table>			Name and place of the exhibition or meeting	Opening date of the exhibition or meeting	Date of first disclosure			
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13 Name of agent <i>(if you have one)</i> Address for service in Hong Kong Telephone Fax Agent's code <i>(if known)</i>	Deacons 3 rd -7 th , 18 th & 29 th Floors, Alexandra House, Central Hong Kong 2825 9336 (Hans Lee) 2810 0431
14 I/We request the Registrar to grant a short-term patent. Signature Name of signatory Official capacity of signatory Date <i>(Day/Month/Year)</i>	 Paul Davies Patent Attorney 06/09/2002

Notes

- (1) *Application on this form should be made in English. (Chinese forms are available if you wish to use Chinese.) The official language in which an application is filed is used as the language of proceedings in all proceedings before the Registrar.*
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 - (a) *If the name of the applicant and inventor are not in Roman letters, you need to give a transliteration in Roman letters.*
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 - (a) *section 116, Patents Ordinance for divisional application;*
 - (b) *section 55, Patents Ordinance for new application filed on court order upon determination of right to patent after grant.*
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COMBING DEVICE WITH ADJUSTABLE TEETH SPACING

FIELD OF INVENTION

This invention relates generally to hair care means such as hair care
5 attachments, devices and apparatuses and, more particularly, to hair care
attachments, devices and apparatuses with means for combing hair, including
combs and hairbrushes. More specifically, although of course not limiting thereto,
this invention relates to a hair care device with combing means for coupling as an
attachment to a hair care apparatus with an air blower. This invention also relates
10 to a hair care apparatus with an air blower and a combing attachment with an
adjustable spacing between the teeth.

BACKGROUND OF THE INVENTION

Hair care devices with means for combing hair are widely used for general
hair care such as combing, smoothing and tidying hair which has become messy.
15 These types of hair care apparatuses are also used to perform hair styling as well as
removing dirt and dis-entangling greasy and lumpy hair.

US Patent 5,729,907 describes such a hair care device as an attachment for
a hair dryer with a comb and a heat transmissive plate for simultaneously drying
and straightening one's hair.

US Patent 3,939,850 describes a combined hair comb and dryer device having baffles arranged to focus the warm hair moving through the device towards the hair as the hair is moving through the comb.

United Kingdom Publication No. GB 2,365,335 describes a hair care
5 apparatus with a combined hair dryer and comb for drying and straightening hair.

Hair care apparatuses and devices having means for combing hair, such as the ones described above, usually include a plurality of elongated teeth distributed at and overhanging the front portion of the main housing of the devices or apparatuses. In use, the elongated teeth are disposed intermediately between the
10 scalp and the handle portion of the main housing of the apparatuses or devices. Known hair care attachments, devices and apparatuses with such combing characteristics usually suffer from the common shortcoming that the teeth spacing between adjacent teeth is fixed which means hair of all thickness has to be treated with the same device, or, alternatively, or different attachments, devices or
15 apparatuses must be used in order to achieve optimal styling, caring or treatment to hair of different thickness or characteristics. Hence, it will be highly desirable if there can be provided attachments, devices or apparatuses with combing features having adjustable teeth spacing to suit individual need in order to provide optimal hair styling, caring or treatment without requiring separate devices for different
20 individuals. Such devices or apparatuses should be relatively simple and easy to use without requiring complicated or careful adjustment steps.

OBJECT OF THE INVENTION

It is therefore an object of the present invention to provide hair care attachments, devices and apparatuses having combing means with adjustable teeth spacing to adapt to different hair thickness to cater for the hair quality of
5 individuals. It is also an object of this invention to provide an attachment for hair care apparatuses or a hair care device or apparatus with combing means having adjustable teeth spacing as well as means for providing other hair care features such as hair blowing, straightening or styling.

SUMMARY OF THE INVENTION

10 According to the present invention, there is provided a hair care device including a main housing, a first comb member, a second comb member, and teeth spacing adjusting means, each of said first and second comb members including a plurality of generally parallel and elongated teeth extending from a base portion, said first and second comb members being disposed on said main housing such
15 that the elongated teeth on said first and second comb members are generally distributed along a first direction and the teeth on said first and said second comb members generally parallel, said first and said second comb members being translatable relative to each other along said first direction, wherein the relative translation of said first and second comb members along said first direction will
20 cause the elongated teeth on one comb member to transverse the space between adjacent teeth on the other comb member to vary the effective teeth spacing of said

device, said teeth spacing adjusting means controls the relative translation between said first and second comb members.

Preferably, said teeth on said first and second comb members generally extend along a second direction, said second direction being non-parallel to said
5 first direction.

Preferably, said second direction being generally orthogonal to said first direction.

Preferably, said at least some of said teeth are tufts of bristles.

Preferably, said teeth spacing adjusting means include means to gradually
10 translate one of said comb members relative to the other comb member.

Preferably, the teeth spacings on said first and second comb members are generally equal.

Preferably, said device is a hair brush or hair brush attachment wherein said teeth are formed from bristles and said second direction along which said bristles
15 extend being radial from the longitudinal axis of said brush.

Preferably, said teeth spacing adjusting means includes a rotatable wheel with its plane of rotation disposed non-perpendicular to said first direction.

Preferably, said plane of rotation of said rotatable wheel being parallel to said first direction.

Preferably, a complete rotation of said rotatable wheel about said first direction as the axis of rotation will result in a cycle of reciprocating motion of one of said comb members along said first direction.

Preferably, said rotatable wheel is connected to a turning knob disposed
5 outside said main housing via a shaft supported by said main housing.

Preferably, said gradual translation of said one of said comb members being driven by a screw-threaded rotary shaft, the longitudinal axis of said screw-threaded shaft being parallel to said first direction.

Preferably, said teeth spacing adjusting means further include means to
10 maintain said one of said comb members at pre-determined positions along said first direction.

Preferably, said pre-determined positions correspond to discrete settings of the effective teeth spacing of said device.

Thus, according to the present invention, there are provided hair care
15 attachments, devices and apparatuses with the features set out above, wherein the teeth spacings on said first and second comb members are generally equal.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the present invention will be explained in further detail by way of example and with reference to the accompanying drawings, in

which:-

Fig. 1 is a top plan view of a comb attachment embodying a first preferred embodiment of the present invention with the teeth of the first and second combing members overlapping.

5 Fig. 2 is a side view of the attachment of Fig. 1 viewing from the left side,

Fig. 3 is a side view of the attachment of Fig. 1 viewing from the right side,

Fig. 4 is a cross-sectional view of the attachment of Fig. 1 taken along the sectional line A-A,

Fig. 4A is an enlarged view of the circled portion of Fig. 4,

10 Fig. 4B is an enlarged view showing the cross-section, upper (left) and under (left) of the adjustment knob,

Fig. 5 is a cross-sectional view of the hair attachment of Fig. 1 taken along the sectional line B-B,

Fig. 5A is an enlarged view of the circled portion of Fig. 5.

15 Fig. 5B is a partial cross-sectional view of the hair attachment of Fig. 1 taken along the line C-C of Fig. 4,

Fig. 6 is a top plan view showing the comb sub-assembly detached from the rest of the attachment,

Fig. 6A is the front view of Fig. 1 with the comb members removed,

Fig. 7 illustrates the operation of the adjustment knob to vary the teeth spacing of the attachment of Fig. 1,

Fig. 7A is an enlarged view showing the circled portion of Fig. 7,

5 Fig. 8 is a top plan view of a comb attachment embodying a second preferred embodiment of the present invention,

Fig. 9 is a cross-sectional view of the comb attachment of Fig. 8 taken along the line A-A,

10 Fig. 9A is partial cross-section of the attachment of Fig. 8 taken along the line C-C,

Fig. 9B is a front view of the attachment of Fig. 8 with the comb sub-assembly removed,

Fig. 9C is an enlarged view of the circled portion showing in more detail the engagement means being connected with the lower portion of the pivotal cock,

15 Fig. 10 is a cross-sectional view of the attachment of Fig. 8 along the line B-B,

Fig. 11 is a rear view of the comb attachment of Fig. 8 revealing in more detail the pivotal cock for moving the engagement tab,

Fig. 12 is a front view of a hair comb of a third embodiment of the present invention with the comb members removed,

Fig. 13 is a top view of the hair comb of Fig. 12 with the comb members intact,

5 Fig. 14 is a cross-sectional view of the hair comb of Fig. 13 taken along the line A-A of Fig. 12,

Fig. 15 is the side view of a fourth embodiment of the present invention configured as a hair comb,

Fig. 16 is a top view of the hair comb of Fig. 15,

10 Fig. 17 is a cross-sectional view of the hair comb of Fig. 15 exposing the more important features of the teeth adjustment means,

Fig. 17A is a cross-sectional view of a modified version of the hair comb of Fig. 15 exposing the fixed and movable comb members as well as the teeth adjusting means,

15 Fig. 18 is a cross-sectional view of a hairbrush showing a fifth preferred embodiment of the present invention,

Fig. 19 is a cross-sectional view of a hair brush showing a sixth preferred embodiment of the present invention,

Fig. 19A is a cross-sectional view taken along the line A-A of Fig. 19.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figs. 1 to 7A, there is shown a first preferred embodiment of a hair care device of the present invention configured as a comb attachment which can be used with, for example, a hair-dryer or a hair blower. The comb attachment
5 1 includes a main housing 10 and a comb sub-assembly 20. The comb sub-assembly includes a first comb member 30, a second comb member 40 and teeth width adjustment means 50. Each of the first comb member 30 and the second comb member 40 includes a plurality of elongated teeth 31, 41 extending from a base portion 32, 42.

10 The elongated teeth 31, 41 on the same comb member are generally parallel to each other with spacing 33, 43 separating adjacent elongated teeth and defining the pitch of the corresponding comb member. The teeth spacings or the pitch 33, 43 between adjacent elongated teeth on the same comb member are preferably substantially identical.

15 In addition, the teeth on the same comb member preferably have the same teeth width so that teeth of the same width are regularly distributed along the length of the base portion of the respective comb members.

The elongated teeth 31, 41 are preferably rigid or semi-rigid and made of, for example, plastics, metal, bakelite, bone or the like. Of course, the elongated
20 teeth can also be made of a flexible material such as soft plastics. Where the elongated teeth are made of plastics or metal, the elongated teeth and the

corresponding base portion can be integrally made from plastics by moulding or from metal by stamping or pressing.

As a variation, the elongated teeth can also be formed by tufts of bristles which are mounted on the base portion of the comb members as holders of the
5 bristles. The first and the second comb members are mounted on the front portion of the main housing 10 so that the comb members 30, 40 are relatively movable in order to change the effective teeth spacing of the comb attachment. This will assist to provide, for example, optimal teeth spacing for hair of corresponding specific thickness.

10 Since the hair being combed will have to pass through the effective teeth spacing of the comb attachment 1, in order to perform appropriate combing, the optimal teeth spacing should be adjustable so that it is neither too wide to allow too many hair to pass through a single pitch at the same time nor too narrow which makes the comb difficult to move through the hair.

15 In order to adjust the effective teeth spacing or pitch, the first 30 and the second 40 comb members of the present embodiment are disposed in a relatively translatable configuration so that the elongated teeth of one comb member (the "first comb member") can be moved towards and away from the teeth member of the other comb member (the "second comb member") in order to cover a portion of
20 the spacing between adjacent teeth of the second comb member. As a result of the relative movements between the first comb member 30 and the second comb

member 40, part of the teeth spacing on the first, movable, comb member 30 is in turn covered by the elongated teeth on the second, fixed, comb member 40, therefore changing the overall effective teeth spacing 34 of the comb attachment, as illustrated in Fig. 7A.

5 For the avoidance of doubt, throughout this description, the effective teeth spacing means the spacing between adjacent elongated teeth minus the spacing being covered by the teeth on another comb member.

 Since the teeth pitches as defined by adjacent teeth on the same comb member are generally parallel to each other, it is preferred that the adjusted teeth
10 spacings are also generally parallel to each other and also generally parallel to the elongated teeth of the comb members. As such, it is preferred that the comb members are relatively movable along a first direction so that the elongated teeth on the moving comb member will remain parallel to that of the other comb members during the movements, although at a different level.

15 In general, the first direction will be at an angle or inclination to the orientation or lengthwise axis of the elongated teeth, which is along a second direction, so that the effective teeth spacing 34 can be conveniently adjusted. In the present preferred embodiments, the comb members are arranged so that the orientation of the elongated teeth is generally orthogonal to the direction of relative
20 movements between the comb members. Thus, the first and the second directions in this embodiment are generally orthogonal and the effective teeth spacing is

adjusted by relative movements of the comb members transversal to the second direction. Of course, the first and second direction can be non-orthogonal and can incline at an appropriate angle.

To provide further convenience, the adjustable comb sub-assembly is
5 mounted on a head portion 11 which is detachable from the main housing 10. As can be seen from Fig. 3, a latching means 12 is provided on the head portion 11 to facilitate detachability between the comb sub-assembly and the main housing.

Turning more particularly to Figs. 4 to 7A, the teeth spacing adjustment means and its operation will be explained in further details.

10 Referring more specifically to Figs. 4 to 5C, the second comb member 40 is fixedly connected to the main housing 10 or, more specifically, to the head portion 11 of the main housing 10 with the teeth generally extending along the second direction from the base portion 42. The head portion 11 of the main housing is also substantially rigid and includes a top, a bottom, sideguards and a front aperture
15 exposing the comb teeth. The sideguards 111, 112 together form a bracket enclosing the teeth members and extend beyond the tip of the comb teeth to keep away hair outside the region being combed from entering the toothed regions. The first, movable, comb member 30 is supported by the second comb member 40 in a movable manner by supporting arrangements 13 which are shown in more detail in
20 Fig. 5A.

The supporting arrangement 13 includes a rivet 131 which connects the first and the second comb members by its stem and traps the comb members by its heads. In order that the first comb member 30 can be movable along the second direction, an elliptical aperture with an opening slightly larger than the diameter of the rivet stem is formed on the first comb member 30. The elliptical aperture is sized so that the first comb member 30 can be translatable along the first direction while being retained by the rivet head.

A separator which is a washer 132 in the present example is placed between the comb members to reduce contact area and therefore friction. To adjust the range of movement and to avoid the rivet from clamping directly on the first comb member, a metal liner 133 is introduced to surround the portion of this stem above the plane of the second comb member 40. This metal liner 133 trims the space between the rivet stem and the aperture on the first comb member for an appropriate range of translation along the first direction, as well as elevating the head of the rivet above the base portion of the first comb member 30.

In order to move and also to control the gradual movement of the first comb member 30, the first comb member 30 is connected to a teeth spacing adjustment means 50 which includes a movement mechanism. The movement mechanism includes a rotary member having a circular head 51 and a screw-threaded shaft portion 52. The shaft portion 52 is rotatably supported on the left sideguard 111 of the main housing.

To restrict the longitudinal movement of the rotary member relative to the sideguard 111, a retention member which is a clip 53, preferably engaging on a circular groove on the shaft 52, is disposed adjacent to the sideguard of the head portion 11. A nut 54 which is engaged on the threaded portion of a shaft 52 is
5 engaged with an indentation formed on the base portion 32 of the first comb member 30. The engagement between the indentation and the nut 54 is preferably in a close-fitted manner so that any longitudinal translation of the nut 54 along the first direction as a result of the rotation of the circular head 51 of the rotary member will result in translational movement of the first comb member along the
10 first direction.

In order to restrict further, unwanted, movements of the movable comb member 30 once a preferred teeth spacing has been selected and set, corresponding holding means are formed on the underside of the rotary adjustment knob 51 and the outside of the sideguard 111. This holding means 510 includes a small dome-
15 shaped indentation 511 formed on the underside of the rotary adjustment knob 51 for engagement with a correspondingly shaped and positioned stud 512 on the outside of the sideguard 111. The holding means 510 can be released from engagement by pulling the rotary adjustment knob 51 away from the sideguard 111 or by depressing the sideguard 111 carrying the rotary member towards the other
20 sideguard 112. The residual resilience of the substantially rigid head portion will then allow this dis-engagement of the holding means.

In order to allow the first comb member to be retained in a plurality of pre-determined positions corresponding to pre-determined effective teeth spacings, a plurality of holding indentations 511 are distributed on the underside of the rotary knob 51 for engagement with the stud 512.

5 Turning now to the operation of the teeth spacing adjustment means, when the rotary head is rotated, the threaded portion of the shaft 52 will also rotate, thereby causing the nut 54 to move towards or away from the rotary head 51 along the threaded shaft. Because of the engagement of the nut 54 with the indentation on the base portion 32 of the first comb member, the first comb member 30 will be
10 brought to move along the longitudinal direction of the shaft 52. Therefore, by disposing the shaft 52 along the first direction, the first comb member can be moved along the first direction with the elongated teeth on the first comb member moving generally parallelly to the elongated teeth on the second comb member.

As the present comb attachment is designed for coupled operation with an
15 hair-dryer or hair blower, one end 13 of the main housing is generally tubular and shaped corresponding to the barrel exit of a compatible hair-dryer or hair blower. In order to divert excessive warm or hot air to move away from the hair if the air outlet of the attachment is blocked while combing, downstream air diverting outlets 14 are disposed adjacent to the head portion of the main housing so that the
20 warm or hot air can be diverted to avoid overheating the scalp.

Referring to Figs. 8 to 11, there is shown a second preferred embodiment of a comb attachment of the present invention. Similar to the first preferred embodiment, this comb attachment 2 also includes a main housing 10 and a comb sub-assembly 20. The comb sub-assembly includes a first comb member 30, a
5 second comb member 40 and teeth width adjustment means 60. Each of the first comb member 30 and the second comb member 40 includes a plurality of elongated teeth 31, 41 extending from a base portion 32, 42. In general, the two embodiments are identical except for the teeth width adjustment means 60. Similar to the first preferred embodiment, the movable first comb member is
10 riveted to the fixed, second, comb member 40 with an elliptical aperture formed on the first comb member 30 with the same peripheral parts.

Instead of a rotary means for adjusting the effective teeth spacing, teeth width spacing adjustment means 60 in the present embodiment includes a push-tab arrangement more particularly shown in Figs. 9, 9B, 9C and 10. The push-tab
15 arrangement includes a push-tab member 61 disposed on the top surface of the head portion 11 and an engagement member with an engagement protrusion 66 disposed underneath the top surface for selection of pitch width by a user. The engagement member includes a pair of bifurcated legs extending through the head portion 11. An elongated hook with a protrusion 66 extending towards the
20 underside of the head portion 11 is formed at the end of each of the bifurcated legs. The underside of the push-tab member is connected to a fork member 62 for driving engagement with a pivotal cock member 63 which is in turn connected to

the first comb member 30. The cock member 63 is pivotally mounted about an axis 64 on the head portion of the main housing 10 and includes a first end in driving engagement with the first comb member 30 and a second end in driving engagement with the fork member 62 of the push-tab 61. Holding means are correspondingly formed on the top portion of the main housing and the underside of the push-tab 61. In the present embodiment, the holding means include a plurality of indentations 65 and the engagement members. The indentations 65 are formed on the main housing and arranged corresponding to discrete effective teeth spacing. The engagement means includes at least a protrusion 66 for engaging with the selected indentation in order to lock the first comb member 30 at a pre-determined position corresponding to a pre-determined effective teeth spacing. Thus, a user can select one of the discrete effective teeth spacings by selecting the positions "1", "2", "3" and "4" to conveniently select the effective teeth spacing for hair caring. The selected position will be reasonably fixed by the engagement between the protrusion 66 with the corresponding indentation 65. This engagement can be released by pushing the push-tab member 61 away from the selected position along the second direction and the resilience of the push-tab arrangement.

Turning now to the operation of the teeth spacing adjustment means, when the push-tab is moved along the second direction, the fork member 62 disposed underneath the push-tab 61 will drive the second end of the cock which causes a pivotal movement of the first end of the cock about the pivotal axis 64, thereby

moving the first comb member 30 along the second direction to adjust the effective teeth spacing.

Referring to Figs. 12 to 14, there is shown a third preferred embodiment of the present invention configured as a comb 3. In general, the comb 3 includes also
5 includes a main housing 10 and a comb sub-assembly 20. The comb sub-assembly includes a first comb member 30, a second comb member 40 and teeth width adjustment means 50. Each of the first comb member 30 and the second comb member 40 includes a plurality of elongated teeth 31, 41 extending from a base portion 32, 42. In this preferred embodiment, the relative disposition of the comb
10 members and the teeth spacing adjustment means 50 are generally identical to that of the first embodiment with appropriate corresponding modifications which are obvious to persons skilled in the art.

Referring to Figs. 15 to 17, there is shown a fourth preferred embodiment of the present invention configured as a comb 4 similar to that of the third
15 embodiment but employing the teeth spacing adjustment means 60 of the second preferred embodiment.

Referring to Fig. 17A, there is shown a modified version of the comb of Figs. 15 to 17. This specific embodiment is generally identical to the embodiment of Figs. 15 to 17 except that the movable comb member 30 is disposed between a
20 left fixed comb member 401 and a right fixed comb member 402. The disposition of a movable comb member 30 between the two fixed comb members 401, 402

alleviates or relieves the stress on the movable comb member 30 since the stress is negotiated and shared firstly by the adjacent fixed comb members.

Referring to Fig. 18, there is shown a fifth preferred embodiment of the present invention configured as a hairbrush 5. In this preferred embodiment, the hairbrush includes a plurality of radially extending bristles which are organized into a first group of movable bristles 531 and a second group of fixed bristles 532. The movable bristles are connected to a shaft or base portion 540 which is movable along the longitudinal direction corresponding to the first direction in the earlier embodiments. The group of movable bristles 531 are translatable along the longitudinal axis (the "first direction") of the hairbrush by connection to the teeth width adjustment means similar to those described in the earlier preferred embodiments. In this specific embodiment, a rotary wheel 550 with a radial slot for engaging with a stud 560 connected to the shaft 540 is provided to move the second bristle group along the axial, or first direction are illustrated as an example.

Referring to Figs. 19 and 19A, there is shown a sixth preferred embodiment of the present invention also configured as a hairbrush 6 which includes a movable comb member 630 with teeth members 631 extending radially from the base portion 632 of the comb members. The hairbrush 6 also includes a fixed comb member 640 which are fixed to the housing 10 of the hairbrush and with teeth members 641 extending from the base portion 642 of the fixed comb member. In contrast to the hairbrush of Fig. 18, the teeth members 631 of the movable comb member 630 of this specific embodiment are disposed intermediate between a first

641A and a second 641B rows of teeth members extending radially from the base portion 642 of the fixed comb member. Similar to the embodiment of Fig. 17A, this sandwiching of the movable comb member between two rows of fixed teeth members alleviates or relieves the stress from the movable teeth members for more effective and more durable brushing.

In the above description, the same numerals have been used to refer to parts which are common to the various embodiments without loss of generality.

While the present invention has been explained by reference to the preferred embodiments described above, it will be appreciated that the embodiments are only examples provided to illustrate the present invention and are not meant to be restrictive on the scope and spirit of the present invention. This invention should be determined from the general principles and spirit of the invention as described above. In particular, variations or modifications which are obvious or trivial to persons skilled in the art, as well as improvements made on the basis of the present invention, should be considered as falling within the scope and boundary of the present invention. Furthermore, while the present invention has been explained by reference to comb attachments, combs and hairbrushes, it should be appreciated that the invention can apply, whether with or without modification, to other hair care devices, attachments or apparatuses.

20

CLAIMS

1. A hair care device including a main housing, a first comb member, a second comb member, and teeth spacing adjusting means, each of said first and second comb members including a plurality of generally parallel and elongated teeth extending from a base portion, said first and second comb members being disposed on said main housing such that the elongated teeth on said first and second comb members are generally distributed along a first direction and the teeth on said first and said second comb members generally parallel, said first and said second comb members being translatable relative to each other along said first direction, wherein the relative translation of said first and second comb members along said first direction will cause the elongated teeth on one comb member to transverse the space between adjacent teeth on the other comb member to vary the effective teeth spacing of said device, said teeth spacing adjusting means controls the relative translation between said first and second comb members.
2. A hair care device according to claim 1, wherein said teeth spacing adjusting means includes a rotatable wheel with its plane of rotation disposed non-perpendicular to said first direction.
3. A hair care device according to claim 2, wherein said plane of rotation of said rotatable wheel being parallel to said first direction.

4. A hair care device according to claim 2, wherein a complete rotation of said rotatable wheel about said first direction as the axis of rotation will result in a cycle of reciprocating motion of one of said comb members along said first direction.
- 5 5. A hair care device according to claim 2, wherein said rotatable wheel is connected to a turning knob disposed outside said main housing via a shaft supported by said main housing.
6. A hair care device according to claim 5, wherein said turning knob includes a screw-threaded shaft, the longitudinal axis of said shaft being parallel to said
10 first direction.
7. A hair care device according to claim 1, wherein said teeth on said first and second comb members generally extend along a second direction, said second direction being non-parallel to said first direction.
8. A hair care device according to claim 7, wherein said second direction being
15 generally orthogonal to said first direction.
9. A hair care device according to claim 1, wherein said at least some of said teeth are tufts of bristles.
10. A hair care device according to claim 1, wherein said teeth spacing adjusting means include means to gradually translate one of said comb members
20 relative to the other comb member.

11. A hair care device according to claim 10, wherein said gradual translation of said one of said comb members being driven by a screw-threaded rotary shaft, the longitudinal axis of said screw-threaded shaft being parallel to said first direction.
- 5 12. A hair care device according to claim 11, wherein said one of said comb members being driven by said screw-threaded rotary shaft via a nut, said nut being rotatable about a plane which is generally orthogonal to said first direction.
- 10 13. A hair care device according to claim 10, wherein said teeth spacing adjusting means further include means to maintain said one of said comb members at pre-determined positions along said first direction.
14. A hair care device according to claim 13, wherein said pre-determined positions correspond to discrete settings of the effective teeth spacing of said device.
- 15 15. A hair care device according to claim 1, wherein the teeth spacings on said first and second comb members are generally equal.
16. A hair care device according to any of the claims 1 to 15, wherein said main housing include a hollow member with an air-inlet, an air-outlet, and a neck portion interconnecting said air-inlet and said air-outlet, said comb members being disposed at said air-outlet with said teeth pointing away from said air-outlet.
- 20

17. A hair care device according to claim 16, wherein said main housing includes means for coupling to the nozzle of a hair care apparatus with a blower.
18. A device according to claim 1, said device is a hair brush or hair brush attachment wherein said teeth are formed from bristles and said second
5 direction along which said bristles extend being radial from the longitudinal axis of said brush.
19. A hair care apparatus including an air blower and a hair care device of any of the preceding claims.

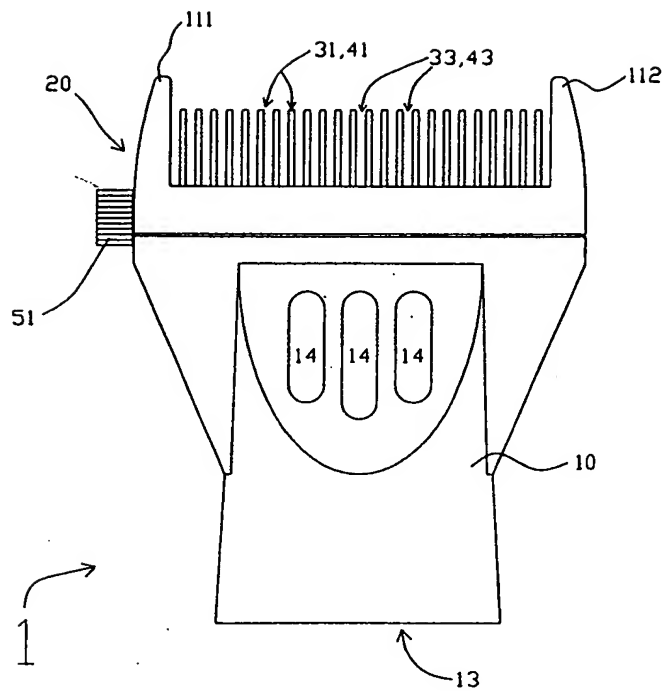


FIG. 1

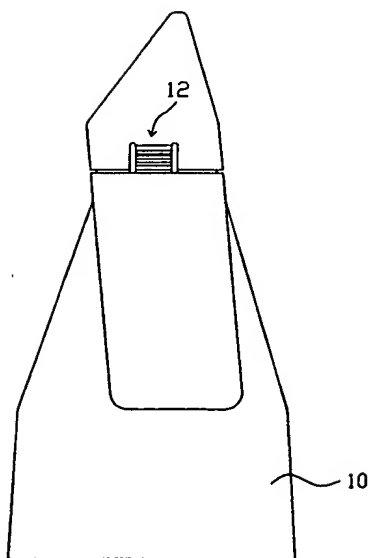


FIG. 3

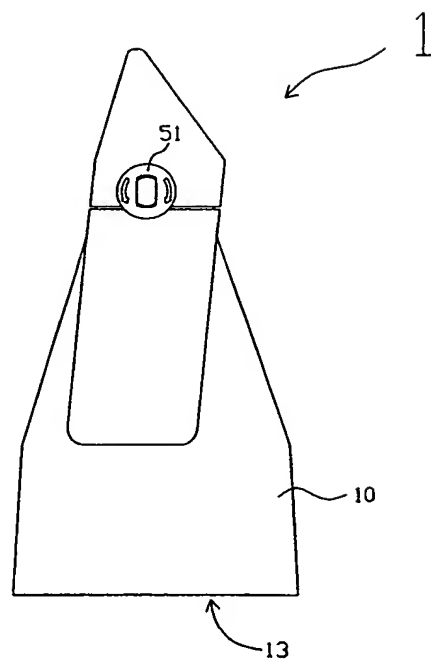
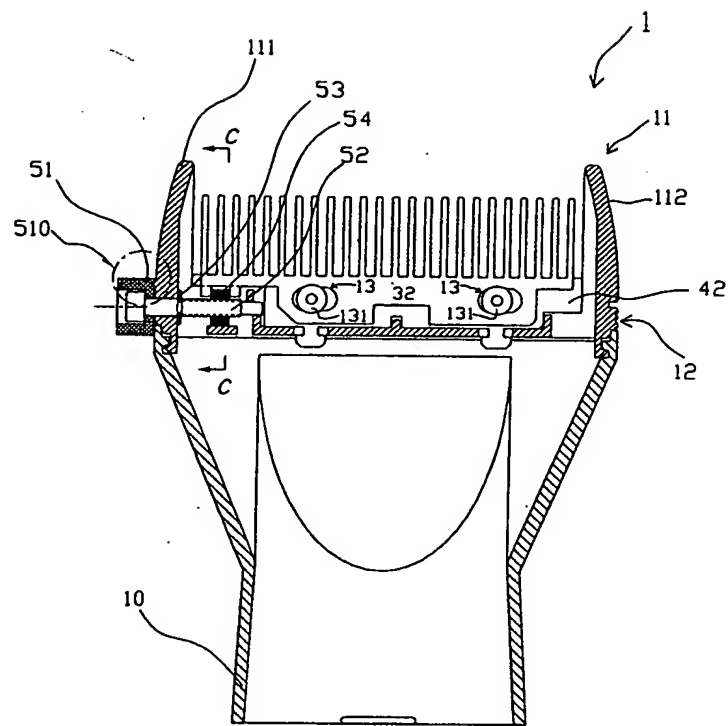


FIG. 2



SECTION A-A

FIG. 4

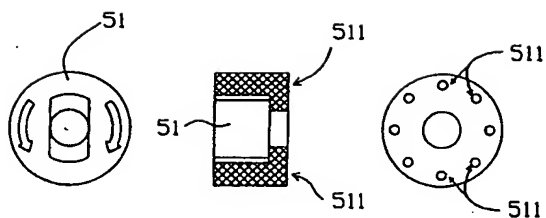


FIG. 4B

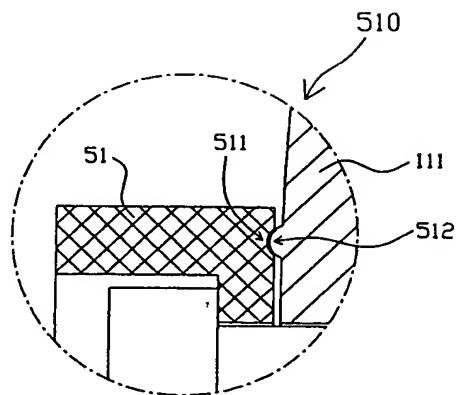
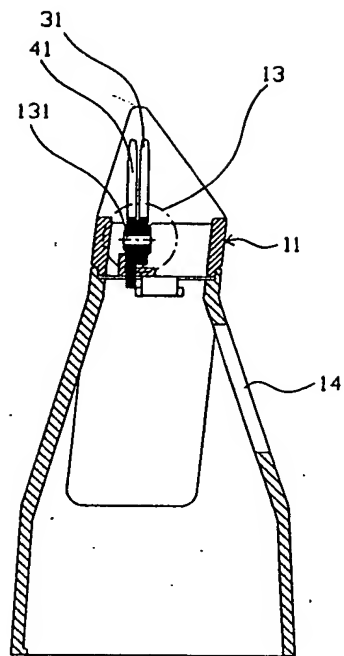


FIG. 4A



SECTION B-B

FIG. 5

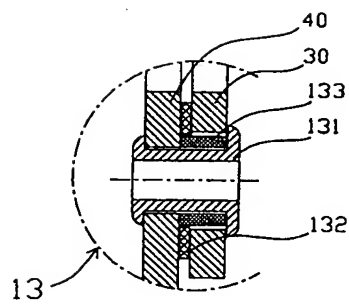
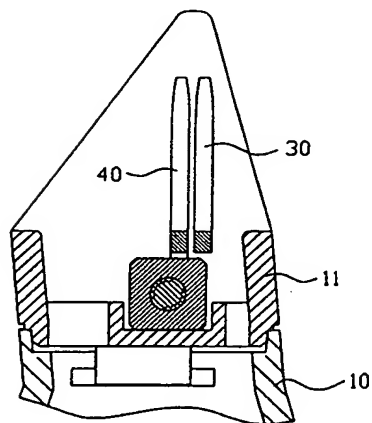
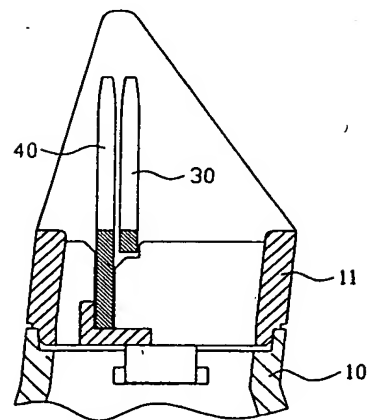


FIG. 5A



SECTION C-C

FIG. 5B



SECTION D-D

FIG. 5C

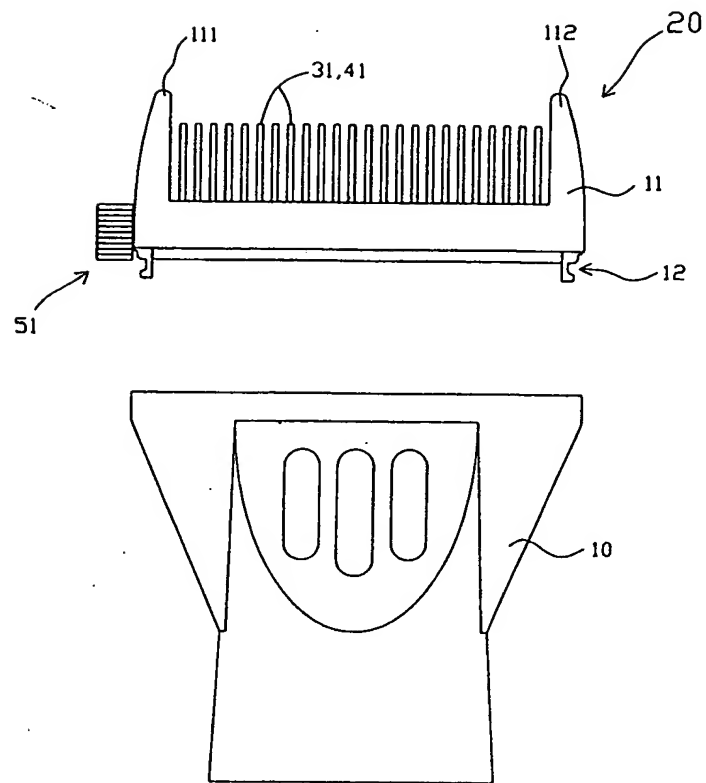


FIG. 6

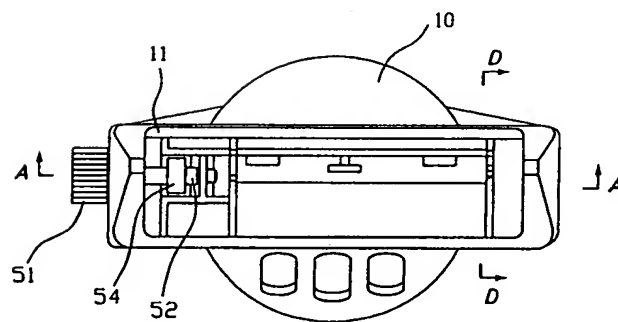


FIG. 6A

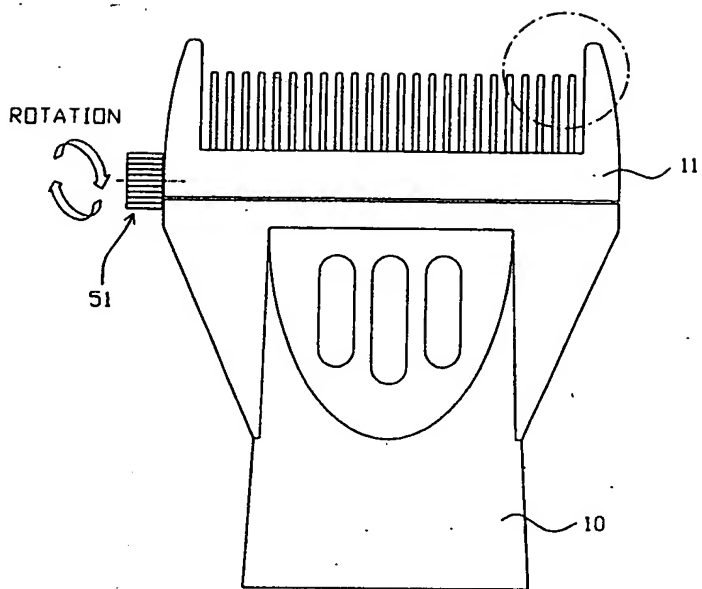


FIG. 7

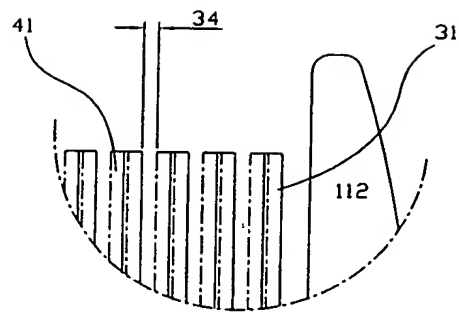


FIG. 7A

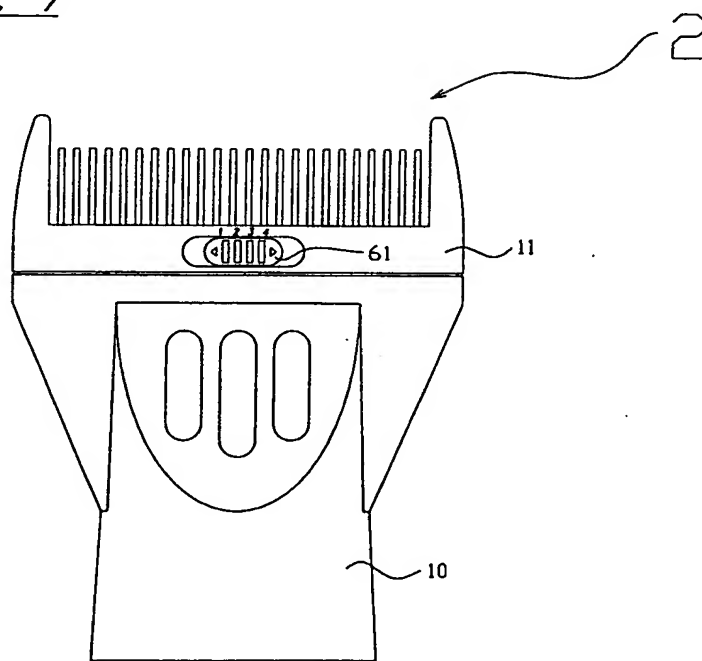
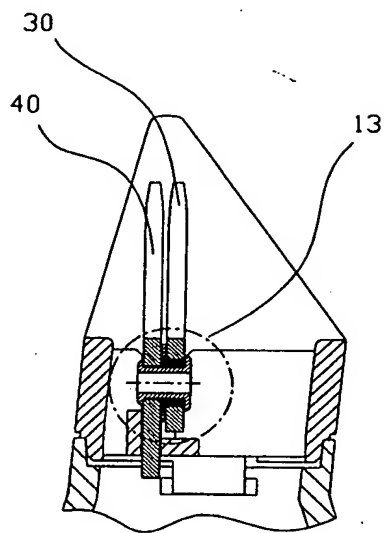
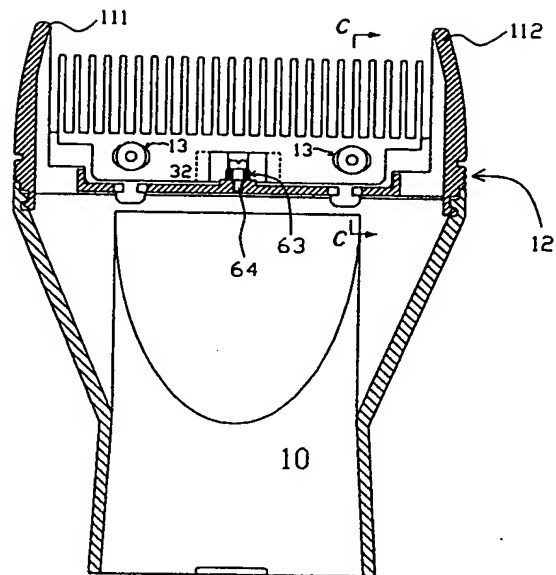


FIG. 8



SECTION C-C

FIG. 9A



SECTION A-A

FIG. 9

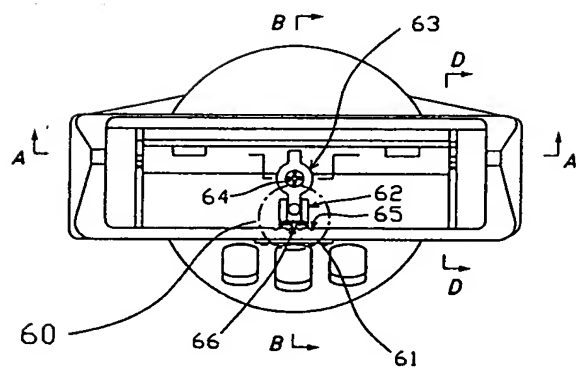


FIG. 9B

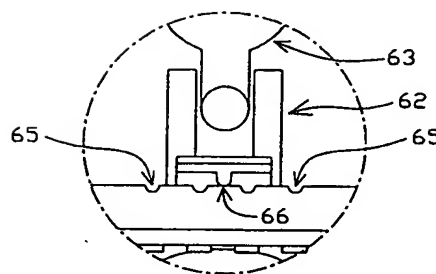


FIG. 9C

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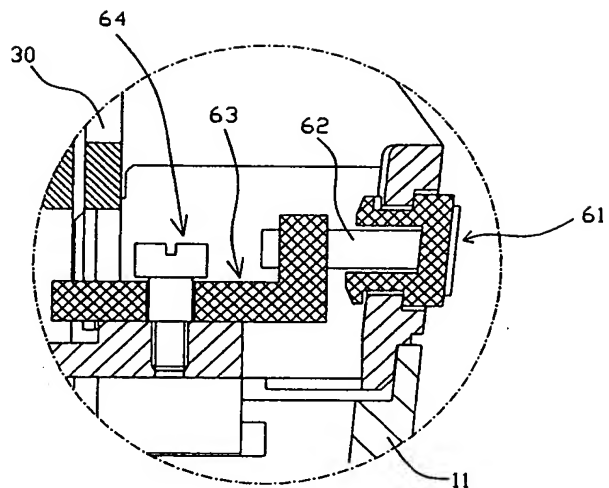
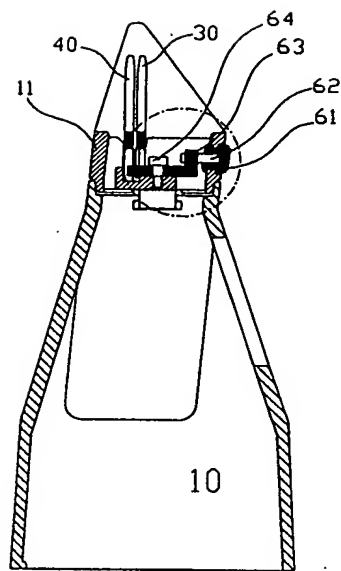


FIG. 10A



SECTION B-B

FIG. 10

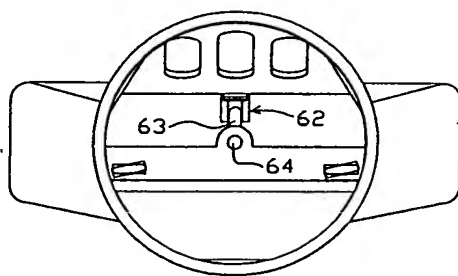
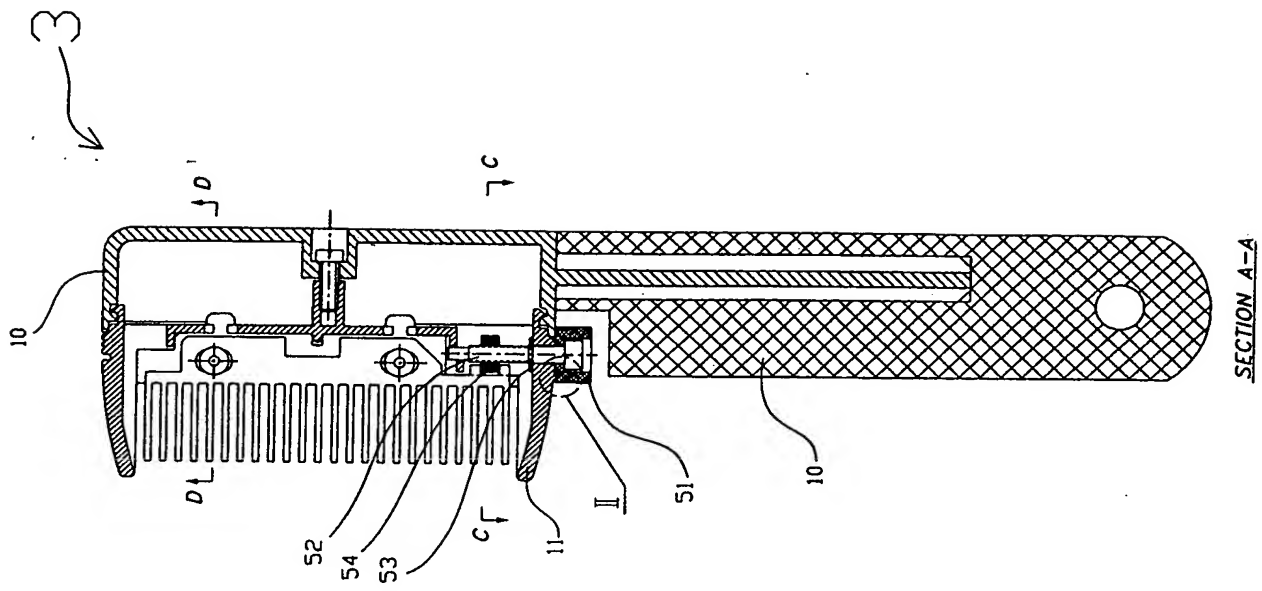
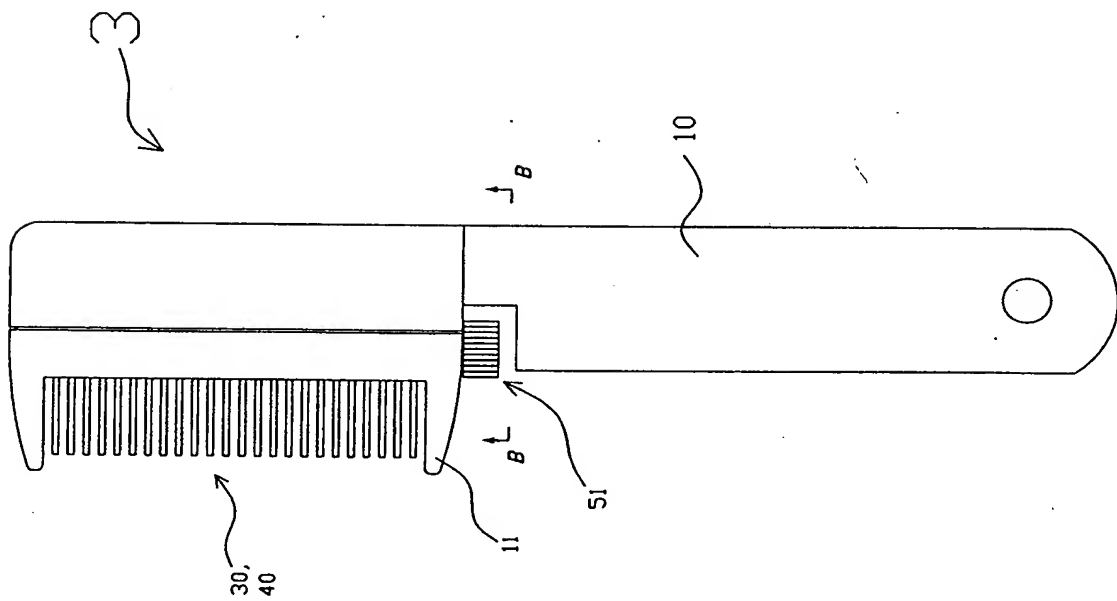
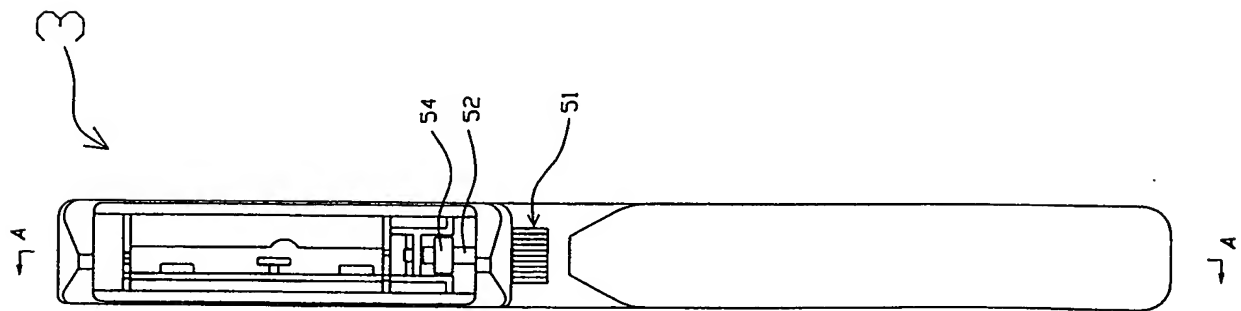


FIG. 11



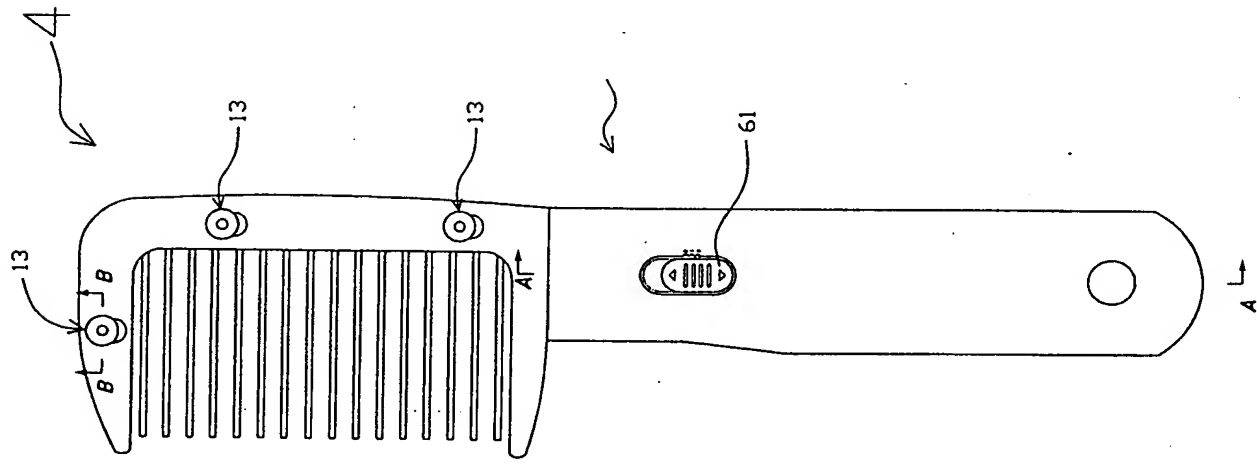


FIG. 15

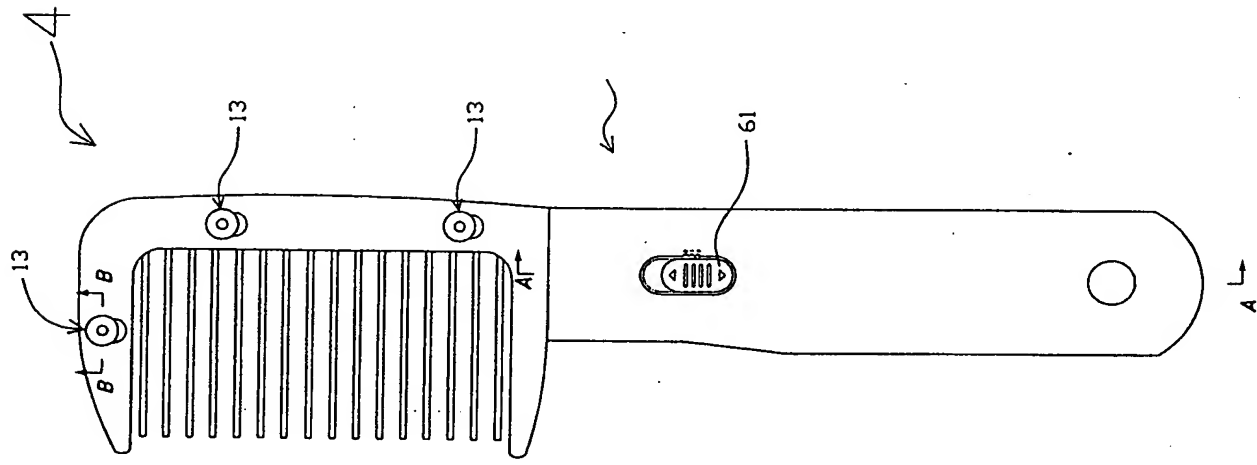


FIG. 16

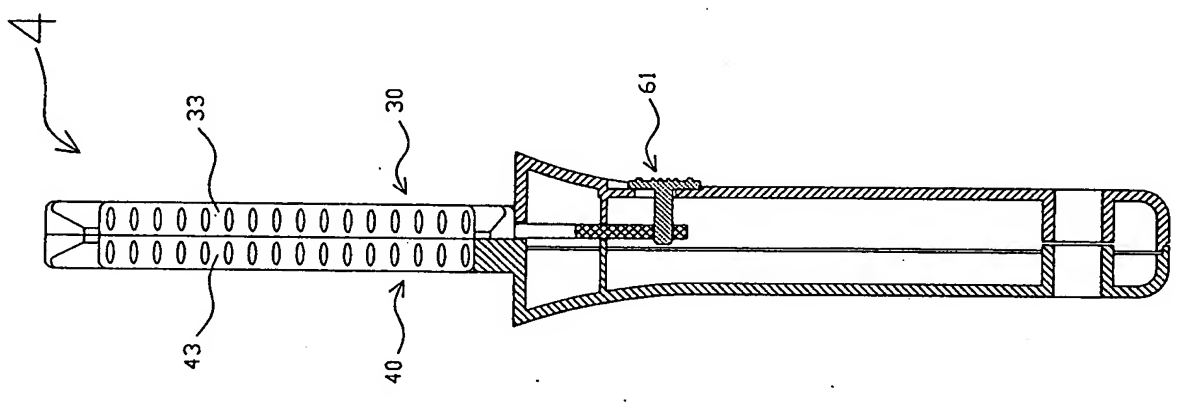


FIG. 17

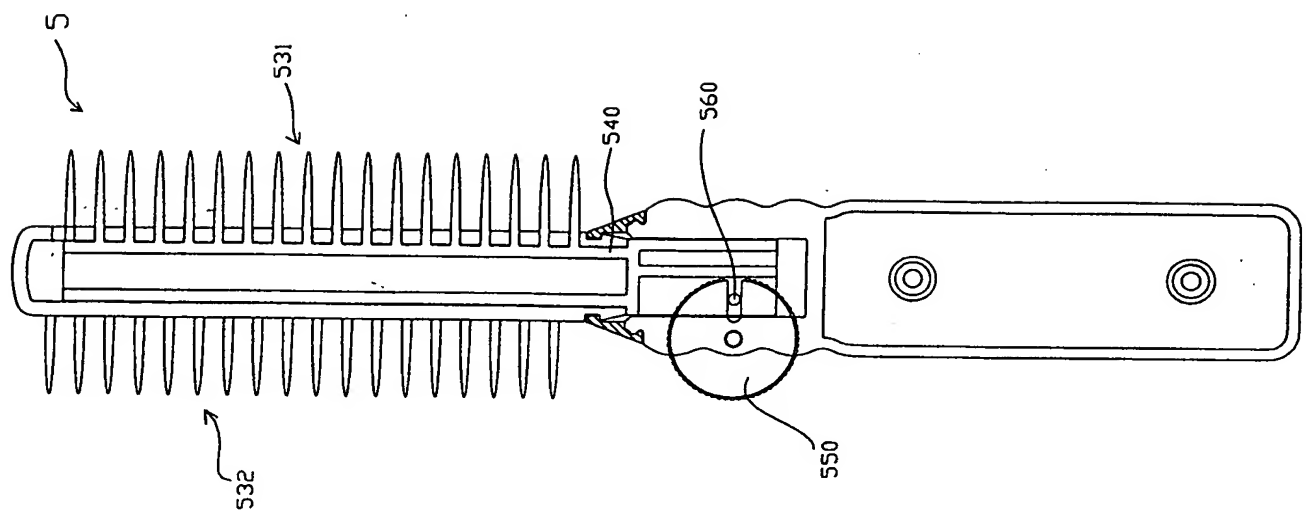


FIG. 18

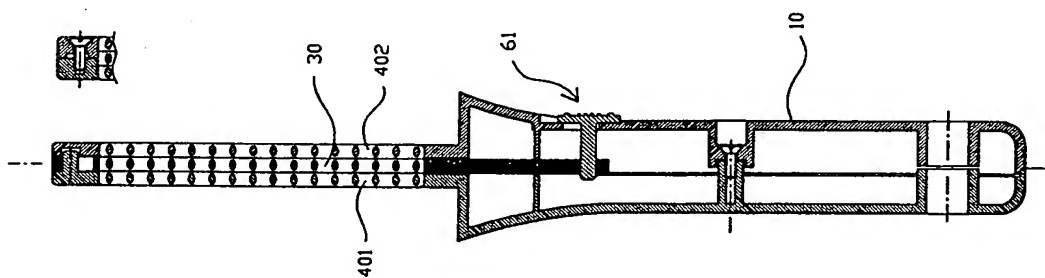


Fig 17A

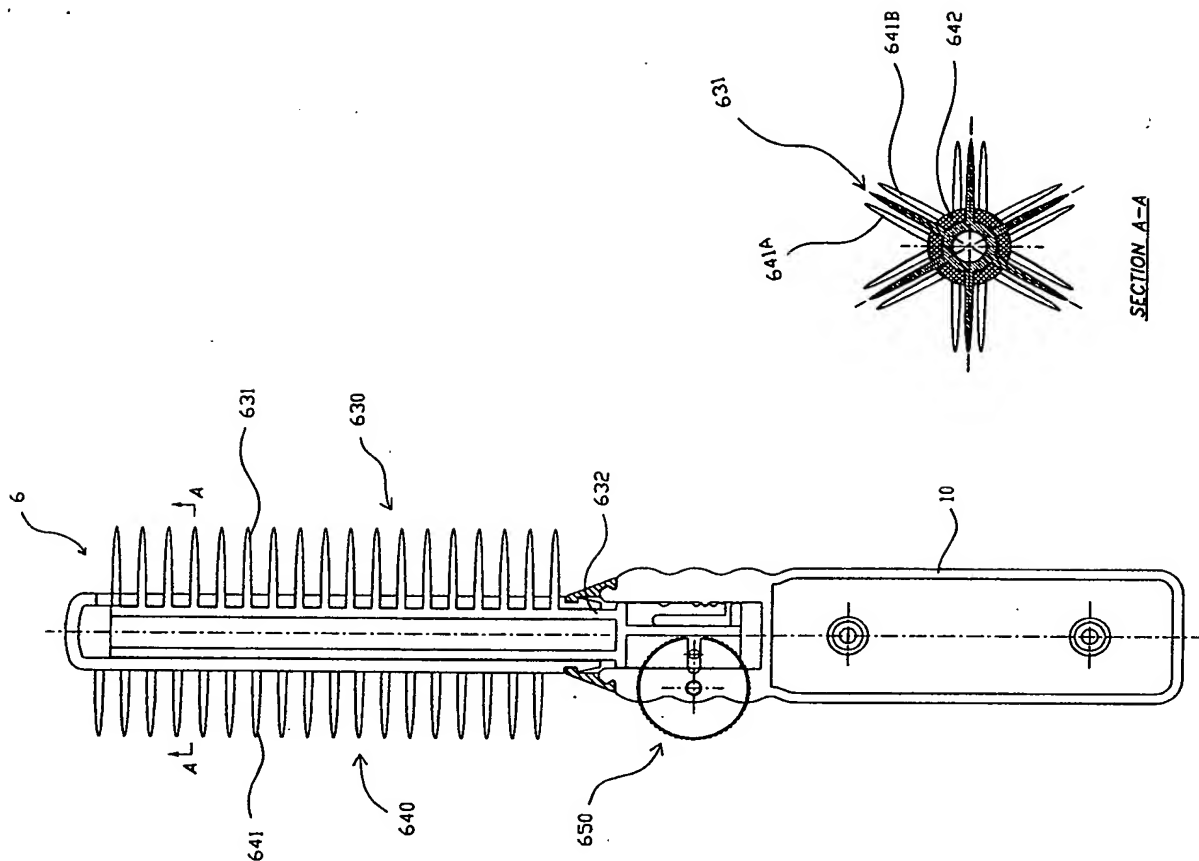


Fig 19

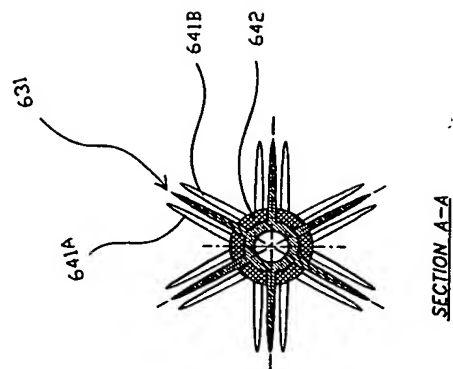


Fig 19A

COMBING DEVICE WITH ADJUSTABLE TEETH SPACING

ABSTRACT

A hair care device including a main housing, a first comb member, a second
5 comb member, and teeth spacing adjusting means, each of said first and second
comb members including a plurality of generally parallel and elongated teeth
extending from a base portion, said first and second comb members being disposed
on said main housing such that the elongated teeth on said first and second comb
members are generally distributed along a first direction and the teeth on said first
10 and said second comb members generally parallel, said first and said second comb
members being translatable relative to each other along said first direction, wherein
the relative translation of said first and second comb members along said first
direction will cause the elongated teeth on one comb member to transverse the
space between adjacent teeth on the other comb member to vary the effective teeth
15 spacing of said device, said teeth spacing adjusting means controls the relative
translation between said first and second comb members.